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Safety in the General Shop

Warren B. Lister

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by

WARREN B. LISTER

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Safety In The General Shop

In this paper a study of methods and procedures used in teaching safety are to be studied. Some of the general safety practices for the shop will be discussed as well as some of the specific safety rules for certain areas of the general shop such as: woodworking, sheetmetal, electricity, and general work.

Introduction.

The shop teacher must plan safety instruction as an integral part of his teaching program. The paramount reason for the teaching of safety is to have the students develop attitudes of respect to the safety element. The safety attitudes should carry over from the school shop directly to home and occupational life. Then, too, it is the shop instructor's duty to employ the best safety precautions humanly possible, to protect his students from injury. He must also think of his own protection and the liability that might be connected with a shop accident.

Reasons Why Industries Want School Shops to Stress Safety.

If you were to ask an employer what are some of the more important factors that potential employees should be

taught, safety would be high on the list. In most cases, it would probably be first. In other words, most employers are greatly concerned about safety for various reasons, such as upsetting the operation of the plant or shop, the loss of man hours, the cost (both direct and indirect), and the humanitarian aspect. The other factors that most employers list after safety are: orderliness, accuracy, cooperative attitude, and industriousness.[1]

It can easily be shown that many of these desirable factors wanted in an employee can be developed in the school shop. If the shop instructor is to develop competency in his students, he must place safe job-behavior high on the list of those characteristics that are desirable in a competent person.

An interesting fact in regards to accidents in industries is that the number of accidents has been on the increase and this increase is greater than the increase in employment.

The cost of accidents to industries is about forty dollars per worker. Visible or direct cost covers such items as wages, medical expenses, and insurance. Indirect costs include such items as damaged equipment and materials and production loss or slow-downs. Both indirect and direct were used in figuring the average cost per worker.

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[1]Le Roy A Faulkner, "Industry Wants School-Shop Safety Training," School Shop, XI (April, 1952), 10.

Industries lost-time accident frequency has decreased in the past twenty-five years. However, the trend at this time is a slight increase in accident frequency. This is probably a result of new processes and new materials which have resulted in increase danger to the workers. These facts plus medical costs have resulted in the high cost per worker.[2]

Since the school shop is in many ways a facsimile of an industrial plant, this then would be the logical place to teach safety. After the students have secured employment in an industrial plant, the safety learned in the school shop should have a direct carry over to the student's occupational life.[3]

School Shop Safety Starts With Planning A Shop

The school shop safety program should begin with the planning of the shop. Most industrial arts instructors are competent in laying out a shop or has access to the information for planning a shop with safety features. He knows that the working areas must be adequately lighted and ventilated. That dust and fumes must be removed by an exhaust system. He understands the precautions that must be taken to avoid fires, and that the working areas around machines must be provided with a non-slip surface.

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[2]Ibid.

[3]Ibid.

Although the shop instructor has been trained in the safety features of a shop, he is sometimes hindered by administrative and financial problems. However, it is suggested that if the shop instructor, administrator, or school directors wish to achieve the best possible results they should consult specialists. The greatest contribution the shop instructor can make in planning a shop is in applying the information of the specialists to his own particular shop situation.

Since each school shop is different it makes it impossible to lay out a plan which may be followed in any great detail. This is the reason why all shop instructors need to know that if safety is to be achieved he must take into consideration such factors as lighting, ventilation, fire protection, floor surfacing, guarding of machines, and floor or working space area.

Each piece of equipment and machines must be considered in relation to these factors as well as the relation of machines to aisles, tools, and equipment rooms.[4]

It might be wise to add here that lighting, ventilation, and fire protection are usually the starting points in planning a safe shop. However, these factors cannot be considered

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[4]Wayne P. Hughes, "Safety Factors In Shop Planning," School Shop, VIII (April, 1949), 7.

first or separate. These general factors must be considered with the specific. Often they must be considered simultaneously.[5]

"Perhaps the most common everyday fault in the average school shop is the failure to make use of equipment and devices that have been installed for safety. Proper and adequate lighting and ventilation facilities may be installed but are of little or no value unless correctly utilized. Machines may be equipped with proper safeguards but the inherent dangers will exit in full force if the machines are not consistently serviced and maintained and if the guards are not used."[6]

Various Methods For Teaching Safety In School Shops.

Teaching safety as a subject is one that requires numerous and varied approaches since safety is a subject which does not appeal to most students or for that matter to most adults.

Generally there are six methods used in teaching safety. These six methods are: the positive approach; the fear approach; the appeal to proficiency; the appeal to humor; the logical approach; and the specific approach.

It is difficult to write or talk about the positive approach without first saying something about the negative approach. In the negative approach, statements are started with "Don't do..." The assumption in the negative approach is that the students are predisposed to do the wrong things which would result in a dangerous outcome. Many authorities believe the negative approach teaches the wrong things at times.[7]

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[5]Ibid., p.8.

[6]Ibid.

[7]Harold T. Glenn, "Teaching Safe Work Habits," School Shop, XVI (January, 1957), 11.

However, the negative approach does have some value, if it is used to strengthen or add to the positive approach. Its danger lies in being overdone.

In the positive approach students are given the correct method for performing an operation and it is assumed that if the procedure is correct, most of the danger has been eliminated.

In the proficiency approach the idea is to make the students approach their task with a feeling of pride and a desire for proficiency. A proficient person always approaches a task with consciousness of its hazards and knows that a job well done is a job finished safely.

The humor approach is considered by some instructors as a highly desirable approach to use in the development of certain safety attitudes. Humor is one of the best ways of motivating people. Humor used in safety illustrations, charts, etc, should be quite broad. Laughter, especially at the expense of others, can be used to alleviate what some individuals feel is dullness in the subject matter.

Most students find it much easier to acquire specific and concrete acts in acquiring safety habits rather than broad generalizations. This is due to the school shop student, precludes the learning of generalizations.[8]

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[8]Ibid., p.12.

Safety cannot be learned by memorizing codes and slogans. Students are inquisitive and anxious to try-out anything about which they have been warned. Therefore, safety slogans and signs are by themselves not enough to insure a good safety program.[9]

A good school shop safety program includes a safe environment and the enforcement of safety rules. It will also include safety instructions that will develop the proper attitudes.

It becomes readily apparent that the safety program must be a continuous process and one which cannot be completed in one lesson, one week, or in any given length of time. Safety starts with the first day or job in the shop and is a continuous process throughout the school year. If the shop instructor "lets up" on safety procedures or practices then students will develop bad tool techniques and a haphazard frame of mind, which after using hand tools may frequently carry over to the improper operation or use of machine tools.[10]

Although some machines are more dangerous than others, all are equipped with guards or safety features that are for the protection of the operator and in some cases serves the

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[9]Chris H. Groneman, "Safety in the School Shop," Industrial Arts and Vocational Education, XL (May, 1951), 26A.

[10]Ibid., p. 27A

dual purpose of guarding the operator and the machine. It has been determined that guards and safety devices afford about 15 per cent protection to the operator. This means that 85 per cent of the accidents that occur are due to the human element. These same figures hold true in nearly every type of activities.

Persons who are reckless, thoughtless, and careless are prone to accidents. The person who is careful, thoughtful and considerate is one who will in nearly all cases be the safe worker.

We may define safety then as the use of good judgment and common sense when performing an operation. Safety is really a matter of positive rather than one of a negative approach.[11]

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[11]Robert E. Smith, Machine Woodworking (Bloomington, Illinois: McKnight and McKnight, 1939), pp. 9-10.

General Safety Rules.

Listed below are some of the general safety rules that all students should be required to learn and successfully pass a test on. These rules are:

1. Secure instructor's permission for operation of all machines.
2. "Horseplay" will definitely not be tolerated in the shop.
3. Think through a machine operation before attempting to operate any machine.
4. Never hurry any operation.
5. See that floor is free of oil, chips, etc., before using any machine.
6. Never talk to anyone operating a machine.
7. Remove any oil film which may be on wrenches, cutting tools, or machine handles before using.
8. Observe all rules or notices by machines.
9. Use tools with care. Never point with a tool or leave it lying around on work tables.
10. Always hand tools to fellow student; never throw them.
11. Button your sleeves when operating a machine. Remove ties and keep hair back.
12. Feed stock only as fast as a machine will take it with ease. Never force it.
13. Always wear goggles when working on a lathe, grinder, and circular saw or whenever there are flying chips or particles.
14. Always stop machines before making adjustments or before oiling.

15. Watch for machine operators when carrying stock or when walking from one area to another.

16. When watching an operation on a machine, stand in painted or designated area.

17. If machine is not working properly notify instructor.

18. Use only new wood on machines; inspect for loose knots or anything else that might endanger you.

19. Never use machines for trivial operations.

20. Do not carry sharp edge tools in your pockets.

21. Always remember to keep your hands behind the cutting edge of a tool.

22. Never put any type of fastener in your mouth.

23. Be extremely careful when removing paint from your face, that you do not get any solvent in your eyes.

24. If instructor has to leave the room, do not use power equipment.

25. Use no tools with mushroomed heads and hammers with loose or broken handles.

26. Do not remove any safety guards from machinery without first asking instructor.

27. Do not use power machinery until you have been given proper use instructions by the instructor.

28. Tighten all adjustments before power is turned on.

29. Be sure all loose tools are removed from machines before power is turned on.

30. Allow machines to completely stop before making an adjustment.

31. Never start or stop a machine for another student.

32. When making special set-ups have instructor check the set-up before attempting the operation.

Specific Safety Rules.

Specific safety rules for the tools and machines listed below should also be learned by the students. Safety rules for only the most commonly used tools and machines in the general shop have been listed.

Chisels:

1. Make sure chisel is correctly sharpened. Do not use a dull chisel.
2. Make sure the handle is tight and that it is not split.
3. Keep hands behind the cutting edge.
4. When using the chisel make sure that its cutting edge is pointing away from you.
5. Clamp work securely before using the chisel.

Saws:

1. Use the thumb as a guide in starting the cut.
2. Pull the saw to start the kerf.
3. After the kerf is started, remove hand that acted as guide.
4. Do not attempt to force the saw or to saw too fast.

Hammers:

1. Use only hammers that have tight fitting handles.
2. Make sure hammer handle is not split.
3. Do not swing a hammer with all of your strength.

Screw Driver:

1. Use only screwdrivers with properly ground tips.
2. Use only the correct size screwdriver. The width of the screwdriver tip and the width of the slot in the screw should be the same.
3. Do not hold the tip of the screwdriver with your fingers.

Planes:

1. Test plane blade for sharpness by testing to see if blade will cut paper. Do not test on thumb nail.

2. Test plane for depth of cut by examining a shaving. Do not try to determine depth by running the fingers over plane bottom.

3. Do not use plane if handle or knob is loose or broken.

Drills:

1. Use only sharp drills.

2. Clamp work securely before starting.

3. Keep fingers away from gears when using the hand drill.

4. Do not use brace with a split knob.

5. Do not force drill.

6. Keep fingers away from revolving drill.

Soldering Coppers:

1. Do not test the coppers by holding near your face or hands.

2. Check handles to see that they are tight.

3. Always lay the soldering copper on the holder.

4. Never pick up a copper, other than by the handle

5. Do not get your face too near the work. Especially when using acid core solder. Acid splatters when the hot iron contacts it and it might get in your eyes.

6. Do not let moisture in any form come in contact with hot solder. It will aplatter and could possibly cause a severe injury.

Tin Snips:

1. Grasp the handles correctly. Do not let a finger get between the handles.

2. Do not use any sort of a striking device to close the jaws of the snips.

Pliers:

1. Do not drop pliers on the floor.

2. Do not substitute pliers for a wrench.

3. Use the correct type of pliers.

Cold Chisel:

1. Do not use cold chisel with a mushroom head.

2. Use goggles when shearing metal with a cold chisel.

Files:

1. Never use a file unless the tang is fitted with a handle.

2. Do not attempt to apply heavy pressure when filing.

Circular Saw:

1. Make all adjustments before starting saw.

2. Make sure all adjustments are locked before starting cut.

3. Do no "free hand" cutting on the circular saw. Use the fences.

4. Use a push stick when ripping boards to width.

5. Do not reach over a saw blade.

6. Do not stand in line with the saw, rather stand to one side.

7. If using a clearance block fasten to the fence. Do not use the ripping fence as a guide for crosscutting.

8. Make sure that the saw blade projects about 1/4 inch above the work.

9. Never cut crooked stock on the circular saw. The stock must have straight edges.

10. Do not use a circular saw with a dull blade.

11. If you must remove some safety device for an operation, be sure you have the instructor's permission to do so as this is very dangerous.

12. Make sure the power is turned off before leaving the saw.

13. If you are helping the operator with long boards, do not pull the boards through, but let the operator push them through.

14. Make sure saw is completely stopped before making any new adjustments.

Band Saw:

1. The saw guide must be adjusted so that the work will pass freely beneath the guide. It is recommended that the guide be 1/4 inch above the work.

2. Do not stand to the right hand side of the band saw.

3. Never attempt to adjust the saw guide while the machine is in motion.

4. Do not back saw blade out of long cuts while the machine is running. Instead allow machine to stop completely and back out slowly.

5. Keep your hands behind the saw line.

6. Do not attempt to cut too small of a radius with the band saw.

7. If blade should break, shut off power and notify instructor.

8. Never allow your fingers to come too close to the saw blade. If a small cut is necessary, use your hand tools.

Jig Saw:

1. Set saw guide as close to the work as possible.
2. Do not feed work too fast.
3. Do not cut small pieces on the jig saw.

Jointer:

1. Always use a push shoe on short pieces.
2. Do not joint pieces shorter than 12 inches long on the jointer.
3. Make not adjustments while machine is running.

Drill Press:

1. Clamp all work, never hold work with your hand.
2. Make sure drill is lined up with table correctly.
3. Wear goggles.
4. Wear a cap if you have long hair.
5. Clean off the shavings with a brush.
6. Never break a shaving coming from the hole with your hand. Use a metal rod.
7. Check your speed and feed chart before turning the power on.
8. Never use a dull drill.

Grinder:

1. Always use safety goggles.
2. Always grind on the face of the wheel, never on the side.
3. Set tool rest close to the grinding wheel.
4. When starting grinder stand to one side, because if the wheel is faulty it will usually break when it starts.
5. Wash hands carefully when you finish grinding to remove enery.

Wood Lathe:

1. Check to see that lathe turns freely. Do this by hand.
2. Check stock for checks, knots, or other defects before mounting in the lathe.
3. Apply oil to dead center, before starting lathe.
4. After mounting stock turn by hand a few times, making sure it clears the tool rest.
5. Check to see that tail stock is securely locked before starting lathe.
6. Use low speed when turning rough stock.
7. Keep the tool rest close to the work.
8. Do not attempt to take a heavy cut with lathe tools.
9. If using the face plate make sure work is fastened securely to it before starting lathe.
10. When sanding work in the lathe, remove the tool rest.
11. Stop the lathe for taking measurements.
12. Always wear goggles when operating the lathe.

Stakes:

1. Make sure you have a good grip on stakes when lifting them.
2. Make sure stakes are clean before using them.
3. Be careful of pointed stakes.

Bar Folder:

1. Grasp handle firmly when using.
2. Remove your hand holding metal, when the machine grasps the metal.
3. Lower the handle slowly after the fold has been made.

Bench Machines:
1. Work sbwly.

2. Watch your fingers.

Slip Roll Forming Machine:
1. Work by yourself; do not have someone else turn the crank for you.

2. Remove metal with care.

Furnaces:
1. Keep valves turned off until you have put a small piece of burning paper in the furnace.

2. Always treat the furnaces as if they were hot. Do not assume it is cool.

3. Do not crowd around furnace.

Shop Electricity:
1. When cutting insulation on electrical wires, keep the knife pointed away from you.

2. When soldering splices, do not touch the wires.

3. Test for a "live" circuit using a test lamp.

4. Use only screwdrivers having insulated handles. Do not use a screwdriver having a metal handle.

5. If you must replace a cartridge fuse from the panel, use a fuse puller to remove same.

6. Tape all splices.

7. If you leave your work area make sure power is turned off.

8. When replacing fuses make sure they are the proper type and size.

9. Caution when working on any electrical line—make sure the power is off at the main switch.

10. Never touch any electrical line; as it may be the live one.

Besides these safety rules for the students, it is the responsibility of the instructor to insist that no student with loose clothing, rings on his fingers, or with a flowing tie shall operate any machine. Above all it is his job to insist that every student follow each and every one of the safety rules. He should never let up on safety, because a man indifferent to his own safety and to the safety of those around him is not a competent workman. The following are a few safety rules that instructors might find it wise to follow:

1. See that all students practice the above safety rules.
2. If instructor must leave the room, he should see that all power is turned off at the main switch box.
3. Check all tools and machines daily to see that they are in safe operating condition.
4. Discard obsolete or unsafe equipment which cannot be up to existing safety standards.
5. See that the proper waste containers are in their designated places.
6. Construct and administer safety tests for each piece of dangerous machinery, and require that students pass all safety tests satisfactorily.
7. See that all materials are safely stacked in their proper place.

Although the safety rules just listed do not cover all possible dangers in the school shops, the most significant and important safety rules have been listed. The enforcement

of these rules, plus the constant alertness of operator and workers, is essential if one wants to run a shop with a low accident rate.[12]

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[12]Louis Barocci, "General Safety Precautions For All Shops" Industrial Arts and Vocational Education, XXXIX (January, 1950), 38.

First Aid

Even after every precaution has been taken to prevent accidents, some will occur in the school shop.

If an accident should occur it is the teacher's responsibility to apply first aid to the injured student. First aid means the dressing of a cut, or burn for the first time. If any further treatment is necessary, it is suggested that it be performed by a qualified person. The teacher should never dress a wound the second time, because this definitely is not first aid.

It would be wise if all industrial arts teachers had a first aid card from the Red Cross. It would also be wise for all industrial arts teachers to have had at least several courses in first aid. Perhaps the teacher training institutions should require all potential industrial arts teachers to take a course in first aid.

It a student is seriously injured the teacher should see that the student is taken to a physician. It would be advisable to know each student's family physician. If this is impossible, then take the student to the school physician. In a less serious accident the decision may be left up to the administration or parents. However, in the case of the parents make sure that a letter is sent to them explaining your

recommendations, keep a duplicate copy of your letter in your file and also the reply of the parents to your letter.

It is suggested that if the teacher applies first aid to an injured student, he does so in a manner that will impress his students. He might start out by washing his hands to show the students the necessity for cleanliness and he may even suggest the student wash out the cut with water. Anyway if the teacher works smoothly, promptly, and efficiently he will make lasting impressions on the students.

It is also the teacher's responsibility to see that the first aid cabinet is kept in a clean, orderly fashion. He must also make sure that the cabinet has the proper supplies in it. Each school shop must determine its own needs as far as supplies are concerned.[13]

Shop Records:

A precise method of recording and reporting an accident should be developed by each teacher of a school shop. The reasons that the shop instructor should record all shop accidents are: the teacher or other interested persons have a chance to study the cause of accidents, and from the liability that may be connected with a shop accident. The report must be filled out in a neat, legible form if it is to be of any use later to the teacher. The report needs to be very specific

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[13]Harold G. Silvius, Estell H. Curry, Teaching Successfully. (Bloomington, Illinois: McKnight and McKnight, 1953), pp.188-199.

when it comes to describing the circumstances that were responsible for the accidents. Carbon copies should also be made of the report or letters and one sent to the administrator.

The school shop teacher must also have several other records kept in his file; these should include such information as: student physician name, home phone number, parent address, and where they may be contacted during school hours.[14]

It is also suggested that a record of all written safety instruction be kept on file along with the test administered to the students along with the dates. These records could prove very useful in the case that the teacher were ever sued for liability.

Liability:

With the occurence of an accident in the school shop, we often ask ourselves the question, "Am I liable for damages caused by accidents in the school shop?" The answer to this question would seem to be that sometimes we are and sometimes we are not.[15]

In practically all the states, except a few, the board of education cannot be held liable for an accident. It

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[14]Ibid., p.205-211.

[15]John Walgren, "Are Shop Teachers Liable for Accidents," School Shop XVI (December, 1956), p.11.

follows then that since the board of education cannot be held liable, then the school employees may be held to be liable for accidents occurring in connection with school activities.

Upon first examination it seems that if a teacher is to be held liable, it must be proved he was negligent. Liability then is established where there is gross negligence. However, this is not necessarily true in that it seems like it becomes the teachers job to prove he was not negligent. This then shows the importance of keeping shop safety records and the need for a well organized school shop safety program, which shows that the accident was due to negligence on the student's part rather than that of the teacher.[16]

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[16]Silvius, op. cit., pp.212-219.

Summary:

It is the shop teacher's responsibility to teach safety as a part of his program for various reasons. These reasons are:

1. Develop safety attitudes in the students which will carry over into home and occupational life.

2. Humanitarian aspect of an accident.

3. The teacher must have a good safety program if he is to prove beyond a doubt that there was no negligence on his part in a school shop accident.

Procedure or Steps in a Good Safety Program:

1. The safety program must begin with the planning of a shop. Such factors as lighting, ventilation, fir protection, floor surfacing, and floor or working space must be studied in planning a safe shop. However, these factors cannot be considered first or separate they must be considered simultaneously in relation to machines, aisles, tools, and equipment rooms.

2. Generally there are six methods used in teaching safety. These six methods are: the positive approach, the appeal to proficiency, the appeal to humor, the fear approach, the logical approach, and the specific approach. The negative approach is the one most commonly used by school shop teachers. However, the humor approach has been the most successful of the six approaches. This is due to the fact that the use of humor is more successful in motivating students.

3. Students find it easier to acquire specific and concrete facts in acquiring safety habits rather than broad generalizations.

4. It is the instructor's responsibility to see that students never "let up" on safety. If he does so, the students develop bad tool techniques and a haphazard frame of mind which could cause a serious accident.

Records:

1. The shop teacher or the school nurse should apply first aid to an injured student. A written record of the accidents with all pertinent data should be kept on file.

2. A file should be kept on each student containing such information as is necessary in case of an injury to the student.

3. Shop instructors are liable for an accident occurring in the school shop. However, if a good safety program is in operation in the shop, then the teacher can usually prove that there was no negligence on his part rather it was the student's negligence which caused the accident.

CONCLUSIONS.

Industry places safety high on the list as one of the most desirable qualities in a potential employee. Therefore, the schools are obligated to teach safety and the most logical place is in the school shop. School shop safety attitudes developed in students must be carried over to their home and occupational life.

The shop teacher, and not the board of education, is liable for negligence in the event of an injury. The teacher must furnish proof in case of an accident proving he was not negligent. This can best be furnished by keeping a file on each student showing the safety record, tests, forms signed by parents and students and the teacher's instruction manual complete with dates. These things however do not relieve the teacher of being morally responsible for teaching safety, and for providing safe working conditions.

The best approach to teaching the students safety is in using a positive approach which may or may not be strengthened or substantiated by the negative approach.

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